A STUDY ON HOSPITAL BASED EMERGENCY MEDICAL SERVICES IN DELHI-NCR

A

SYNOPSIS

SUBMITTED TO THE

RAFFLES UNIVERSITY,

FOR THE DEGREE

OF

DOCTOR OF PHILOSOPHY

IN

Management

RAFFLES
UNIVERSITY

BY

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Year 2024

RAFFLES UNIVERSITY
Research Cell

B. Second page- Information Page

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(iii) Admission Number.	:231007
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Title: **A Study on Hospital Based Emergency Medical Services in Delhi-NCR**

1. INTRODUCTION

1.1. Emergency Medical Services (EMS)

Emergency care refers to the provision of critical, time-sensitive interventions intended to prevent mortality and incapacity, for which a longer wait time may make the prognosis worse or reduce the effectiveness of care. People with severe illnesses and injuries seek care every day from across the world. Comprehensive emergency care, or fast, high-quality emergency care for everyone in need should be the aim of an efficient medical emergency system.

Emergency Medical Services (EMS) contributes significantly to public safety by lowering the rates of morbidity and death. Using the limited physical and human resources available, emergency medical services (EMS) are primarily responsible for assigning emergency vehicles, tracing the nearby hospital for patient transfers, and providing vital on-site emergency care resources in a well-organized and effective manner. When assessing an EMS system's performance, time is considered as the most important element. For instance, the chance of life for a seriously injured individual after a car accident relies on how quickly the patient gets medical attention. The odds of surviving are higher the smaller the duration. Medical terminology refers to this idea as "golden hour." This idea is not exclusive to emergencies involving trauma. Time is considered as the essence when it comes to heart attacks and strokes, and patients must receive emergency medical attention in order to survive (Kevin, 2011).

Crafting an proficient EMS system requires a multitude of interconnected strategic choices. These encompass selecting appropriate hospitals, refining dispatch protocols, determining vehicle types and numbers, and pinpointing optimal deployment spots for ambulance or, emergency vehicles. The realm of emergency management is characterized by a dearth of pre-existing information, with most data emerging in real-time, rendering the landscape dynamic and intricately challenging to grasp.

1.2. Current Status of Emergency Care in The India

Emergencies and accidents are prevalent across India, a nation experiencing both the challenges of a developing economy and the complexities of rapid urbanization. Daily, the country confronts a dual onslaught of infectious diseases and chronic illnesses alongside

trauma incidents. Pre-hospital care is primarily administered by state-regulated ambulances, operated by the Emergency Management and Research Institute, accessible via the toll-free number 108. However, these amenities lack incorporation with government or Emergency Department command centers and fail to notify emergency departments in advance. This rudimentary EMS structure urgently requires modernization and alignment with state and national healthcare systems. India's fragmented ambulance services struggle with staggering statistics: over 150,000 road traffic fatalities annually, 98.5% of ambulance runs transporting deceased individuals, and a deficiency of equipment and trained personnel. Despite strides, India's EMS landscape mirrors the fragmented systems of 1960s America. The nation harbors two publicly funded ambulance networks, denoted by helpline numbers 108 and 102, collectively boasting over 17,000 ambulances (Subhan, 2010).

Due to its ambitious growth goals and rapidly expanding population, India has historically maintained a relatively modest health budget. This is reflected in statistics such as one doctor for every 1,700 people and shouldering approximately 21% of the global disease burden. India's Constitution guarantees the right to timely medical treatment, yet the healthcare system grapples with constrained budgets and substantial health burdens.

In India, nearly 23% of all trauma cases are linked to transportation incidents, resulting in approximately 13,740 accidents and 400 fatalities daily on the roads (Rajagopal & Mohan, 2015.

According to a report of "Trauma in India, 2015" Government of India Ministry of Road Transport & Highways Transport Research Wing, transportation-related trauma accounting for 23% of cases, India's emergency healthcare infrastructure faces multifaceted challenges, including the highest snakebite mortality globally, estimated at 30,000 deaths annually by the World Health Organization.

1.3. Emergency Burden in India

In 1990, the predominant contributors to disease burden in India were Communicable, maternal, perinatal, and nutritional conditions. However, by 2016, the landscape had shifted, with three of the top five causes being non communicable diseases (NCDs), indicating a notable transition towards NCDs (refer to Table 1). Over the period from 1990 to 2016, the burden of most NCDs, as measured by Disability-Adjusted Life Years (DALYs), showed an upward trend. Among the NCDs, diabetes saw the most substantial increase in all-age DALYs rate, at 80.0% (95% uncertainty interval [UI] 71.6–88.5), followed by ischaemic

heart disease at 33.9% (24.7–43.6%), and sense organ diseases, primarily related to vision and hearing loss disorders, at 21.7% (20.1–23.3%). These statistics underscore the growing significance of NCDs as major contributors to the disease burden in India by 2016, particularly evident among the top 30 leading causes of DALYs.

Table-1: Contribution of disease categories to total deaths		
Year		2016
Population		1,32,42,00,000
Causes:		In Percentage (%)
A. Communicable, maternal, perinatal and nutritional conditions		27.5
B. Non-communicable diseases		61.8
i. Cardiovascular diseases	28.1	
ii. Respiratory diseases	10.9	
iii. Malignant neoplasms	8.3	
iv. Diabetes mellitus	6.5	
v. Others	8.0	
C. Injuries		10.7
All Causes		**100**

Source: WHO Report

2. REVIEW OF LITERATURE

Response times can be greatly shortened in nations with efficient emergency medical services and a sufficient fleet of ambulances. But in places like low and middle income countries (LMICs), when demand outpaces supply, reaction times are lengthy for of a lack of both human and physical resources. The World Health Organization (WHO) states that there ought to be one ambulance per 100,000 persons. One ambulance per 144,736 persons is an alarming ratio in Delhi, even it is the national capital of India (Khanna, 2019). A portion of the total number of ambulances are set aside for non-emergency duties including transporting patients between medical facilities or escorting discharged patients home. As a result, there are fewer ambulances accessible for situations involving serious injury or death (Singh, 2014).

To effectively address both current and future demands, it is imperative to bolster the EMS

fleet. Unlike the centralized 911 system in the US, India lacks a singular EMS service. Responsibility for EMS in India is distributed among various public and private entities, leading to a dearth of resource coordination and protocol standardization. This fragmented approach suggests inadequate funding or inconsistent support for EMS, ultimately diminishing its capacity and quality (Sriram, et al., 2016). Similar EMS traits can also be seen in South Asian and African1 nations, as well as in Nepal, Nigeria, and Vietnam (Pandey, 2016; Bhandari, 2020; Usoro et al., 2021; Hoang, 2021). In terms of cost as well as response time, a centralized and integrated emergency supply system is more effective than a decentralized system in the event of a major disaster (Sheu & Pan, 2016).

A variety of ML strategies have been employed by numerous researchers in the past decade for EMS decision-making created a profound reinforcement learning structure for a dynamic ambulance relocation strategy for movable ambulances to shorten patient pick-up times. In the last ten years, scholars have used a range of machine learning strategies for decision-making regarding EMS. One notable example involves the expansion of a deep reinforcement learning framework aimed at dynamically redeploying ambulances to minimize patient pick-up times (Delir Haghighi et al., 2013; Cabitza et al., 2018; Beam & Kohane, 2018; Ji S et al., 2019).

Whereas some study has focused on forecasting ambulance demand by means of machine learning, and/or artificial intelligence methodologies, other researches have focused on their utility in forecasting travel times. Boutilier and Chan (2018), for instance, introduced regression analysis as a means to assess travel time distributions of ambulance between designated locations, leveraging GPS data gleaned from previous ambulance journeys along specific route networks. These approaches are instrumental in developing tools capable of identifying emergency scenarios from recorded calls, such as instances of cardiac arrest, facilitating prompt medical intervention. Additionally, Chi et al. (2008) devised a distinctive prediction and optimization-focused system for guidance in decisions to construct a hospital referral proficient system.

For the application of machine learning EMS models suggested in the recent, the infrastructure lay-out and other factors are must be checked. Because all the recent AI based or, machine learning EMS models have the assumptions that all the requisite facilities are available and the environment is fit for the running the new EMS models related to transport and communication, research and development, latest technology, human resources, and other factors etc.

3. JUSTIFICATION OF THE STUDY

In the bustling expanse of the Delhi-NCR region, where life moves at an exhilarating pace, the need for efficient emergency medical services cannot be overstated. The sprawling urban landscape, marked by its dense population and incessant activity, necessitates a well-coordinated network of hospitals and emergency facilities to ensure timely medical assistance in moments of crisis. Against this backdrop, the endeavour to map and optimize hospital-based emergency services emerges as a paramount initiative.

The "Planning for Mapping of Hospital-Based Emergency Services in Delhi-NCR Region" seeks to address the intricate interplay of geographical, infrastructural, and demographic factors that influence the accessibility and efficacy of emergency medical care. By meticulously charting the existing landscape of hospitals, trauma centers, and emergency response units across Delhi-NCR, this undertaking aims to identify gaps, redundancies, and opportunities for enhancement within the current framework.

Amidst the cacophony of metropolitan life, the ability to swiftly navigate through the maze of healthcare facilities can spell the difference between life and death. Hence, the planning for mapping of hospital-based emergency services assumes a pivotal role in fostering resilience, responsiveness, and reliability within the region's healthcare ecosystem. Through collaboration, innovation, and data-driven insights, this initiative aspires to lay the groundwork for a more robust, inclusive, and accessible emergency medical infrastructure across Delhi-NCR.

Planning for implementation of new EMS models in India, the environment, infrastructures, and other aspects such as must considered. The other factors include transport and communication, research and development, latest technology, human resources, and other factors etc. In this proposed research work, I wish to investigate into the rationale behind this planning initiative, elucidate its objectives, and underscore the significance of such comprehensive mapping in bolstering the region's emergency healthcare infrastructure. From the challenges posed by urban sprawl and traffic congestion to the imperatives of resource allocation and strategic positioning, every facet of this endeavour reflects a commitment to ensuring prompt and proficient emergency medical services for the denizens of Delhi-NCR.

4. OBJECTIVES OF THE STUDY

1) To ascertain the present state of hospitals' facility-based emergency and injury care in Delhi and NCR.
2) To evaluate the state of the connections between the emergency and injury care systems in Delhi and NCR.
3) To compare the cost of emergency circumstances, containing injury Pre-hospital care, which includes intra-specific ambulance service referrals and Hospital Treatment (final care) in private hospitals.

5. PROBLEM TO BE STUDIED

1) India is a developing country and much has been done in the EMS and it is in progress. But, whether the environment, infrastructures, and other factors are sufficient for the application of the new EMS models in Delhi and NCR?
2) Whether state of the connections between the emergency and injury care systems in Delhi and NCR is functioning well and smoothly?
3) There is a difference of cost of emergency services among the different levels of hospitals in Delhi and NCR.

6. RESEARCH DESIGN

6.1. Types of Research: The nature of this research is descriptive and diagnostic research as in this research there is no influence of researcher over the events and happening related to planning for mapping of hospital based emergency services in Delhi-NCR region.

6.2. Population: All the hospital based emergency services in Delhi-NCR region.

6.3. Sample Area: Selected hospitals which render based emergency services in Delhi-NCR region.

6.4. Sample Size: 20-30 hospitals which render emergency services in Delhi-NCR region.

6.5. Methods of Sampling: Convenient sampling method.

6.6. Collection of Data: Primary and secondary both types of data will be collected for the research work.

Primary data will be collected through structured questionnaire or schedules. The

respondents will be the emergency administration department of the hospital in the sample area. Also, the primary data will be collected through the patients and by observations made.

Secondary data will be gathered through journal, papers, book, magazines, Government Reports, etc.

7. STATISTICAL TOOLS AND TECHNIQUES

Statistical tools like N Par test for descriptive analysis, Simple and Multiple Correlation Analysis for viewing casual association among variables, Regression Analysis for cause effect relation between variables, ANOVA, for testing the significant difference - Chi Square Test, for validation of data - Chronbach alpha may be taken in to use in this research work.

8. SIGNIFICANCE OF THE STUDY

The proposed study will be helpful in the planning for the implementation of new EMS models in the hospitals in Delhi and NCA. The inferences of the study will be bringing new insight in highly connected and well-coordinated health system, particularly during emergencies.

9. TENTATIVE CHAPTER PLAN

The tentative chapter plan of the research work is proposed as follows:

Chapter Number	Name of the Chapter
Chapter - 1	Introduction
Chapter - 2	Review of Literature
Chapter - 3	Research Methodology
Chapter - 4	Data Collection and Analysis
Chapter -5	Testing of Hypotheses
Chapter - 6	Conclusion, Recommendations and Suggestions

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